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USDOE FOR SHANE JOHNSON, TOM CUTLER, AND COURTNEY GILLESPIE
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TAGS: ENRG TRGY BEXP EINV EFIN ECON PREL IN
SUBJECT: INDIA'S SECRETARY FOR ATOMIC ENERGY DEFENDS NUCLEAR FUEL REPROCESSING AND RECYCLING AT SEMINAR IN MUMBAI

MUMBAI 00000341 001.2 OF 004

Summary: 1. (U) In a recent speech in Mumbai, Anil Kakodkar, Secretary of the Department of Atomic Energy and Chairman of the Atomic Energy Commission, justified India's decision to reprocess and re-cycle spent nuclear fuel at a seminar in Mumbai. Using the twin arguments of climate change mitigation and sustainability, Kakodkar advocated that nuclear energy should constitute a prominent portion of India's total energy mix, and that reprocessing technology to re-use spent nuclear fuel was essential to unleashing the full potential of nuclear energy. If India is not allowed to re-process spent nuclear fuel from imported reactors, Kakodkar warned that 1.2 billion tons of coal may have to be imported annually to cover India's energy gap. Audience members expressed skepticism about Kakodkar's calls for more nuclear energy, and extolled the importance of renewable energy sources instead. Their fears and comments, though in some cases misinformed, reveal that many in India are more enthusiastic about the potential of less-expensive and easier to deploy renewable energy options -- even if many of these plans remain on paper -- than nuclear energy for India's future and the fight against climate change. End Summary.

Per Capita Energy Consumption in India Inadequate and Unsustainable

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¶2. (U) At an August 4 seminar in Mumbai, Anil Kakodkar, the Secretary of the Department of Atomic Energy (DAE) and the Chairman of the Atomic Energy Commission, argued that the expansion of nuclear power production in India offered the best opportunity to meet India's growing energy needs and to mitigate carbon emissions-led climate change. Kakodkar predicted that India's per capita energy consumption of 700 KWh per person per year would grow tenfold in the coming decades, which domestic energy resources were woefully inadequate to meet. He argued that nuclear energy was non-polluting, sustainable, and released more energy per kilogram of fuel than coal.

¶3. (U) In India, nuclear energy comprises three percent of total energy generation capacity and is projected to account for 7 percent of the energy mix by 2020. DAE anticipates that nuclear energy capacity in India could rise to 20 percent of the total energy generation capacity by 2050 under the three-stage nuclear energy program that includes the recycling of spent nuclear fuel, compared to 16-17 percent of the total energy generation capacity globally. Kakodkar conjectured that 3,000-4,000 new reactors of varying capacities would have to be commissioned across the world if nuclear energy was to constitute 50 percent of the global total energy capacity. Due to sheer volumes, all of these new reactors, both in India and abroad, would have to be located near high population densities, and consequently, would require more advanced safety features.

Private Participation Inevitable, but under NPCIL Control

¶4. (U) Kakodkar acknowledged that India's sole nuclear energy operator, the Nuclear Power Corporation of India (NPCIL), although cash-rich, would not be able to independently finance and develop the large number of reactors envisioned to ensure energy security for India. The NPCIL would have to partner with other Indian companies through joint ventures (JV), he admitted. However, NPCIL would hold the majority stake in every JV at least for some time, he said. Kakodkar pointed to the case of the ill-fated Dabhol Power Project built by a consortium of U.S. companies led by the Enron Corporation. He explained that a

nuclear power plant, once commissioned, has to function even if it is not producing energy; it cannot be closed or shut like Dabhol was by Enron. For these reasons, he explained, a partnership with NPCIL is in the best interests for the country. The private sector should take advantage of the company's years of experience and expertise of building India's nuclear energy capacity. (Note: Kakodkar did not specify whether foreign companies would be allowed to partner with NPCIL. However, even foreign participation in nuclear energy generation does not solve the larger problem of insufficient trained personnel to operate the large number of reactors being planned, a problem Indian nuclear energy planners have recognized. End Note).

Spent Fuel Reprocessing Only Sustainable Long-Term Alternative

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¶5. (U) Kakodkar pointed to a DAE study of India's energy resources which estimated that domestic coal resources would last for 130 years based on current energy consumption patterns. Coal would last for barely 11 years at the energy consumption level projected in 2050. Hydrocarbons would run out even earlier, and uranium would also be radically depleted, he said. Kakodkar noted that India's uranium reserves were limited and inadequate to fuel the type of nuclear energy program envisioned in the country. For this reason, he emphasized, India has pursued a three stage nuclear energy program which involves the reprocessing and recycling of spent nuclear fuel. Under this program, nuclear fuel powering 10,000 MW of energy capacity can theoretically be re-used multiple times to generate up to 200,000-500,000 MW of energy, he said.

¶6. (U) Kakodkar admitted that there are proliferation concerns

related to the reprocessing and recycling of nuclear fuel, but argued that India's limited uranium reserves prevented the country from accepting a policy of zero recycling of spent nuclear fuel. He pointed to India's achievement in successfully developing research-scale fast breeder reactor (FBR) technology that marked the second stage of India's three stage nuclear energy program. The third stage of the nuclear energy program envisions unleashing huge quantities of energy through thorium reactors. India has among the world's largest reserves of thorium that, even at projected 2050 energy consumption levels, is sufficient to last for two centuries.

¶7. (U) The DAE projects India's energy requirement to be around 1,300 GW by 2050, assuming a per capita consumption level of 5,000 KWh per person per year. According to the DAE study, the country would face an energy deficit of 400 GW even after tapping all conventional and renewable sources of energy, including that unleashed from India's three stage indigenous nuclear energy program. In 2050, bridging this deficit would imply importing 1.2 billion tons of coal each year. Kakodkar explained that the purpose of international civil nuclear co-operation is "to take advantage of every possible additionality over and above the domestic three stage nuclear energy program." Imported nuclear reactors could help augment the domestic nuclear energy capacity but will not alone bridge the energy deficit. However, if imported reactors are included in India's three stage program so that spent fuel from the imported reactor could be re-cycled and reused in the FBRs, then the additional energy unleashed could significantly narrow the energy gap to 170 GW, Kakodkar maintained. This would decrease annual imports of coal to 0.7 billion tons.

¶8. (U) The projected energy deficit could also be bridged through energy imports. However, Kakodkar claimed that importing energy resources, whether coal or uranium, requires

huge sums of capital. On the other hand, he argued that the three stage program would allow India to tap every available indigenous energy source to meet its energy requirements rather than rely on importing energy resources which will become more scarce and valuable over time. For these reasons, Kakodkar emphasized, India has to adopt a three stage nuclear energy program which involves the reprocessing and recycling of spent nuclear fuel for multiple re-use in nuclear reactors. This would enable nuclear energy capacity to rise to 300 GW by 2050. The nuclear energy mix would be comprised of indigenously developed pressurized heavy water reactors (PHWRs) of 220 MW, 540 MW, and 700 MW capacities, boiling water reactors, imported light water reactors (LWRs), and fast breeder reactors (FBRs).

¶9. (U) The DAE's vision is to construct four FBRs of 500 MW capacity each by 2020. A prototype 500 MW FBR is currently under construction and is expected to be commissioned by end-2010. A critical facility of the third stage Advanced Heavy Water Reactor (AHWR) was commissioned last year, and construction of a prototype 300 MW AHWR will soon begin. According to Kakodkar, the AHWR, which produces 68 percent of its power from thorium, is being designed with a three day grace period in case of a nuclear accident to enable the operator to implement counter-measures. This is currently not available in any nuclear reactor, he said. The design life of the AHWR is planned for 100 years, well beyond the 60-year lifespan of other reactors. (Note: U.S. reactors are licensed for 60 years, but anticipated to have a longer, undefined lifespan. End Note). Kakodkar acknowledged that the AHWRs were still "many years" away from successful commercial-scale commissioning. He explained that fissile material (uranium-233) inventory has to be built in the second stage to enable the third stage of the nuclear power program to take off.

India's Comparative Cost Advantage in Building Reactors Should Translate to More Local Content for Imported Reactors

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¶10. (U) According to Kakodkar, Indian nuclear power facilities measure more favorably in terms of cost as compared to international nuclear energy facilities. Nuclear reactor facilities can be constructed at a cost of $1,700 per KWh in India, as compared to $2,000-2,500 per KWh internationally, and can be built in the same amount of time, he claimed. Kakodkar stressed India's relative cost competitiveness as the reason LWR technology imported into India should use "progressively localized content." Without tapping India's nuclear equipment manufacturing supply chain, imported reactors will not be cost competitive, he argued. The DAE is itself working towards reducing the capital cost of FBRs to bring down cost, he added.

¶11. (U) Kakodkar also touted India's capability of building and operating pressurized heavy water reactors (PHWRs) comparable to international standards and said that the country was considering exporting its new prototype 700 MW PHWR reactor once it was successfully commissioned. Kakodkar also pointed to the export opportunities for Indian service providers for equipment supply and plant life service management to extend the life of ageing nuclear power plants.

Audience Prefers Renewables To Nuclear Energy

¶12. (U) In a question and answer session following the talk,

audience members expressed skepticism over Kakodkar's plans, and accused the DAE of emulating the U.S. energy landscape at the expense of renewable energy solutions. Kakodkar stated that the U.S.-India Civil Nuclear Energy Cooperation Agreement made it possible for India to target an increasing share of nuclear energy capacity in its total energy mix. Kakodkar agreed that India had to make full and complete use of any and all renewable energy solutions, but argued that renewable energy could account only for a fraction of India's growing energy requirements. He also addressed audience concern that technical or equipment failures -- particularly from foreign companies -- could lead to nuclear accidents by assuring that modern nuclear plants have extensive safety features that would prevent a Chernobyl-like event. He also explained that nuclear energy-fuelled electricity was no different from coal-fired thermal power, and residents therefore had no reason to fear radiation exposure from electricity supply from nuclear power plants. Finally, responding to accusations that India was emulating the U.S., Kakodkar pointed out that India (and the DAE) was an "ardent custodian of the three stage nuclear energy program" which it would have abandoned if it wanted to copy the U.S. He insisted that the world would soon emulate India's approach based on utilizing reprocessed fuel. France was already reprocessing nuclear fuel and Russia was also considering the proposal, he said. According to Kakodkar, even the U.S., which was initially vehemently opposed to nuclear fuel reprocessing, may decide to adopt this practice, which reduces the quantity of nuclear waste and mitigates the problem of climate change.

Comment:

¶13. (SBU) Kakodkar, the self-appointed guardian of India's three stage nuclear energy program, used his speaking engagement as an opportunity to push forward the case for reprocessing and reusing domestic and imported nuclear fuel in both domestic and imported reactors. He did not address India's hope to acquire cutting edge enrichment and reprocessing (ENR) technology to augment its indigenous technology. As with most other Government of India-run research and development programs, the expansion of nuclear energy capacity in India has been slow and plodding. The DAE believes that a five-fold augmentation in nuclear energy capacity in another 10-odd years is possible now that the country has access to hitherto-denied imported nuclear fuel and reactors. However, given the slow pace of nuclear energy development and government's monopoly over nuclear energy research and operations, it is doubtful that the DAE's ambitious nuclear energy expansion program will proceed as projected. As more coal plants come on line, India would have to develop nuclear power plants at a rate far exceeding any past performance to meet its 7 percent goal by 2020, unlikely with the government's existing monopoly and steep learning curve for private sector participation, not to mention the inevitable and unexpected regulatory and political hurdles. Moreover, his well-articulated arguments failed to resound with a prominent, mainly non-technical audience, who, apart from his colleagues at DAE and NPCIL, comprised of businessmen, academics, journalists, and NGOs, skeptical of the potential for nuclear power development in India, where a passion for renewable energy has taken hold. For them, renewable energy rather than nuclear energy remains a more attractive solution to energy security and climate change in India. End Comment.
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